United Nations

FCCC/ARR/2013/GRC

Framework Convention on Climate Change

Distr.: General
4 March 2014

English only

Report of the individual review of the annual submission of Greece submitted in 2013*

* In the symbol for this document, 2013 refers to the year in which the inventory was submitted, and not to the year of publication.

GE.14-60280

1460280

Please recycle

Contents

		Paragraphs	*Page*
I.	Introduction and summary	1–5	3
II.	Technical assessment of the annual submission	6–100	7
	A. Overview	6–17	7
	B. Energy	18–30	12
	C. Industrial processes and solvent and other product use	31–39	16
	D. Agriculture	40–54	18
	E. Land use, land-use change and forestry	55–72	22
	F. Waste	73–82	26
	G. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol	83–100	28
III.	Conclusions and recommendations	101–102	34
	A. Conclusions	101	34
	B. Recommendations	102	35
IV.	Questions of implementation	103	41

Annexes

I.	Background data on recalculations and information to be included in the compilation and accounting database	42
II.	Documents and information used during the review	48
III.	Acronyms and abbreviations	50

I. Introduction and summary

1. This report covers the review of the 2013 annual submission of Greece, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 16 to 21 September 2013 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Mr. Harry Vreuls (Netherlands) and Ms. Melissa Weitz (United States of America); energy – Mr. Graham Anderson (Australia), Mr. Constantin Harjeu (Romania), Ms. Anna Sikharulidze (Georgia) and Mr. Sergiy Skybyk (Ukraine); industrial processes and solvent and other product use – Ms. Ingrid Person Rocha e Pinho (Brazil) and Mr. Samir Tantawi (Egypt); agriculture – Mr. Michael Anderl (Austria), Ms. Rocio Danica Condor (Italy) and Mr. Paulo Cornejo (Chile); land use, land-use change and forestry (LULUCF) – Mr. Manuel Estrada (Mexico), Ms. Akane Nagahisa (Japan) and Mr. Nalin Srivastava (India); and waste – Ms. Baasansuren Jamsranjav (Mongolia) and Mr. Gustavo Barbosa Mozzer (Brazil). Ms. Person and Mr. Vreuls were the lead reviewers. The review was coordinated by Ms. Kyoko Miwa (UNFCCC secretariat).

2. In accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines), a draft version of this report was communicated to the Government of Greece, which provided comments that were considered and incorporated, as appropriate, into this final version of the report. All encouragements and recommendations in this report are for the next annual submission, unless otherwise specified. The expert review team (ERT) notes that the 2012 annual review report of Greece was published after the submission of the 2013 annual submission.

3. In 2011, the main greenhouse gas (GHG) in Greece was carbon dioxide (CO_2), accounting for 82.4 per cent of total GHG emissions[1] expressed in CO_2 equivalent (CO_2 eq), followed by methane (CH_4) (8.4 per cent) and nitrous oxide (N_2O) (6.1 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 3.1 per cent of the overall GHG emissions in the country. The energy sector accounted for 80.1 per cent of total GHG emissions, followed by the agriculture sector (7.8 per cent), the industrial processes sector (7.7 per cent), the waste sector (4.1 per cent) and the solvent and other product use sector (0.3 per cent). Total GHG emissions amounted to 115,045.02 Gg CO_2 eq and increased by 7.7 per cent between the base year[2] and 2011. The ERT concludes that the description in the national inventory report (NIR) of the trends for the different gases and sectors is reasonable.

4. Tables 1 and 2 show GHG emissions from sources included in Annex A to the Kyoto Protocol (hereinafter referred to as Annex A sources), emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, elected activities under Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively. In table 1, CO_2, CH_4 and N_2O emissions included in the rows under Annex A sources do not include emissions and removals from the LULUCF sector.

[1] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding LULUCF, unless otherwise specified.

[2] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions include emissions from Annex A sources only.

5. Additional background data on recalculations by Greece in the 2013 annual submission, as well as information to be included in the compilation and accounting database, can be found in annex I to this report.

Table 1

Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, by gas, base year[a] to 2011

			Gg CO_2 eq							*Change (%)*
		Greenhouse gas	*Base year[a]*	*1990*	*1995*	*2000*	*2008*	*2009*	*2010*	*2011*	*Base year–2011*
Annex A sources		CO_2	82 909.34	82 909.34	86 349.53	102 500.56	109 909.56	103 577.27	96 558.51	94 813.63	14.4
		CH_4	10 336.24	10 336.24	10 594.76	10 833.97	10 008.74	9 739.24	9 784.13	9 630.76	–6.8
		N_2O	10 239.50	10 239.50	8 996.80	8 537.05	7 474.59	7 015.59	7 315.61	7 010.34	–31.5
		HFCs	3 290.41	935.06	3 290.41	4 243.79	2 844.35	3 226.65	3 512.16	3 507.46	6.6
		PFCs	53.97	163.37	53.97	105.09	89.10	69.85	101.57	77.69	43.9
		SF_6	3.59	3.07	3.59	3.99	7.53	5.26	6.14	5.15	43.7
KP-LULUCF	Article 3.3[b]	CO_2					–298.01	–302.68	–306.76	–304.97	
		CH_4					NA	NA	NA	NA	
		N_2O					NA	NA	NA	NA	
	Article 3.4[c]	CO_2	NA				–1 778.67	–1 778.67	–1 778.67	–1 778.67	NA
		CH_4	NA				8.26	9.01	3.82	1.64	NA
		N_2O	NA				0.84	0.91	0.39	0.17	NA

Abbreviations: KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable.

[a] "Base year" for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The "base year" for cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1990. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[c] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

Table 2
Greenhouse gas emissions by sector and activity, base year[a] to 2011

		Gg CO_2 eq								*Change (%)*
	Sector	*Base year[a]*	*1990*	*1995*	*2000*	*2008*	*2009*	*2010*	*2011*	*Base year–2011*
Annex A	Energy	77 170.88	77 170.88	80 619.14	96 482.97	104 109.16	99 587.47	92 293.12	92 165.18	19.4
	Industrial processes	12 319.39	10 072.94	12 263.12	13 712.49	11 775.07	10 132.20	10 496.20	8 893.78	–27.8
	Solvent and other product use	308.34	308.34	299.82	306.61	314.13	315.60	316.17	316.41	2.6
	Agriculture	11 460.07	11 460.07	10 318.69	9 939.90	9 211.13	8 927.68	9 270.66	8 965.84	–21.8
	Waste	5 574.35	5 574.35	5 788.29	5 782.47	4 924.37	4 670.90	4 901.96	4 703.81	–15.6
	LULUCF	NA	–2 496.73	–3 154.27	–2 715.87	–2 868.48	–2 613.56	–2 600.19	–2 539.59	NA
	Total (with LULUCF)	**NA**	**102 089.85**	**106 134.78**	**123 508.57**	**127 465.38**	**121 020.29**	**114 677.93**	**112 505.42**	**NA**
	Total (without LULUCF)	**106 833.04**	**104 586.58**	**109 289.05**	**126 224.44**	**130 333.87**	**123 633.85**	**117 278.12**	**115 045.02**	**7.7**
	Other[b]	NA	NA	NA	NA	NA	NA	NA	NA	NA
KP-LULUCF Article 3.3[c]	Afforestation and reforestation					–350.63	–350.63	–350.63	–350.63	
	Deforestation					52.62	47.95	43.87	45.65	
	Total (3.3)					**–298.01**	**–302.68**	**–306.76**	**–304.97**	
KP-LULUCF Article 3.4[d]	Forest management					–1 769.57	–1 768.75	–1 774.46	–1 776.87	
	Cropland management	NA				NA	NA	NA	NA	NA
	Grazing land management	NA				NA	NA	NA	NA	NA
	Revegetation	NA				NA	NA	NA	NA	NA
	Total (3.4)	**NA**				**–1 769.57**	**–1 768.75**	**–1 774.46**	**–1 776.87**	**NA**

Abbreviations: KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable.

[a] "Base year" for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The "base year" for cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1990. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Emissions/removals reported in the sector other (sector 7) are not included in Annex A to the Kyoto Protocol and are therefore not included in national totals.

[c] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[d] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

6. The 2013 annual inventory submission was submitted on 15 April 2013 (complete set of common reporting format (CRF) tables for the period 1990–2011) and the NIR was submitted on 16 April 2013. Greece also submitted the information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry, and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 15 April 2013. The annual submission was submitted in accordance with decision 15/CMP.1.

7. The full list of materials used during the review is provided in annex II to this report.

2. Overall assessment of the inventory

8. Table 3 contains the ERT's overall assessment of the annual submission of Greece. For recommendations for improvements related to cross-cutting issues for specific categories, please see the paragraphs cross-referenced in the table.

Table 3
The expert review team's overall assessment of the annual submission

		General findings and recommendations
The expert review team's (ERT's) findings on completeness of the 2013 annual submission		
Annex A sources[a]	Complete	Mandatory: None
		Non-mandatory: CO_2 from asphalt roofing and road paving with asphalt; potential emissions of HFCs, PFCs and SF_6 (see para. 33 below)
Land use, land-use change and forestry[a]	Not complete	Mandatory: "NE" is reported for: the carbon stock changes in living biomass and dead organic matter pools in grassland converted to forest land; the carbon stock losses in living biomass pool in cropland converted to settlements; the carbon stock changes in soil pool in grassland converted to settlements; and the carbon stock changes in soil pool in grassland converted to other land

		General findings and recommendations
		Non-mandatory: "NE" is reported for: the carbon stock losses in living biomass pools in wetlands remaining wetlands; carbon stock changes in living biomass pools in settlements remaining settlements; CH_4 and N_2O emissions from flooded lands
KP-LULUCF	Not complete	Carbon stock changes in the litter, dead wood and soil pools are not reported for afforested and reforested grassland under afforestation and reforestation (see para. 85 below); "NE" is reported for carbon stock changes in litter and dead wood and mineral soils of some areas under forest management; N_2O emissions from disturbance associated with land-use conversion to cropland under deforestation activity were not estimated or reported, but were wrongly reported as "NA" (see para. 88 below)
The ERT's findings on recalculations and time-series consistency in the 2013 annual submission	Consistent	
The ERT's findings on verification and quality assurance/quality control procedures in the 2013 annual submission	Sufficient	The ERT recommends that Greece strengthen its QC procedures, in order to, among others, enhance the consistency of the data in the NIR and the CRF tables, (see paras. 58, 61, 75, 78 and 79 below
The ERT's findings on the transparency of the 2013 annual submission	Generally sufficient	The ERT recommends that Greece provide improved information on the AD actually used in the calculation of the estimates (e.g. in the energy and agriculture sectors) (see para. 20 below) and on the AD and method used for estimating wastewater handling (see para. 80 below)

Abbreviations: AD = activity data, Annex A sources = sources included in Annex A to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable, NE = not estimated, NIR = national inventory report, NO = not occurring, QC = quality control.

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*).

3. Description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

Inventory planning

9. The NIR described the national system for the preparation of the inventory. The Ministry of Environment, Energy and Climate Change (MEECC) has overall responsibility

for the national inventory. Its responsibilities include: the coordination of all organizations involved in the preparation of the inventory; overseeing the operation of the national system; the official approval of the inventory submission; responding to any issues raised in the inventory review process; the archiving of inventory information; the administration of the national registry; and the supervision of the quality assurance/quality control (QA/QC).

10. The National Technical University of Athens (NTUA) School of Chemical Engineering is a technical consultant of MEECC and is responsible for the technical and scientific aspects of the planning, preparation and management of the inventory. The NTUA (Inventory Team) works on a long-term contract basis. The NTUA (Inventory Team) also has the responsibility to develop QA/QC procedures and to implement these under the supervision of MEECC. Reliability checks of input data are conducted by the comparison of the same or similar data from alternative data sources and by time-series assessment in order to identify changes that cannot be explained. The QA system is based on the ISO 9001:2000 standard and its quality objectives and highlights are reported in the NIR.

11. NTUA cooperates with a number of ministries and governmental agencies for the compilation of the national inventory through a legal agreement released by MEECC in 2008 (Circular 918/21-4-08 "Structure and Operation of the National Greenhouse Gases Inventory System – Roles and Responsibilities") which defines each entity's responsibilities with respect to the preparation of the inventory and data provision. As a result of the restructuring of roles of ministries in the national inventory system since then, the roles of the ministries in the national inventory system have changed. In the NIR Greece report which governmental agencies and ministries are involved, and develop and maintain (within their terms of operation) the data sets and emission methodology information necessary for the estimation of emissions and removals.

12. The ministries and agencies involved in addition to MEECC include the Hellenic Statistical Authority of Greece (EL.STAT), the Ministry of Development, Competitiveness, Infrastructure, Transport and Networks, the Ministry of Rural Development and Food, and the Public Power Corporation. These are the major data providers for the energy balance of Greece. In addition, NTUA uses data and relevant information from a number of national and international organizations, private entities and individual industrial companies. These data are frequently used to supplement the official data (e.g. for the QC procedures).

Inventory preparation

13. Table 4 contains the ERT's assessment of Greece's inventory preparation process. For improvements related to specific categories, please see the paragraphs cross-referenced in the table.

Table 4
Assessment of inventory preparation by Greece

		General findings and recommendations
Key category analysis		
Was the key category analysis performed in accordance with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF)?	Yes	Level and trend analysis performed, including and excluding LULUCF

	General findings and recommendations
Approach followed?	Tier 1
Were additional key categories identified using a qualitative approach?	No
Has Greece identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC inventory?	Yes
Does Greece use the key category analysis to prioritize inventory improvements?	Yes
Are there any changes to the key category analysis in the latest submission?	No
Assessment of uncertainty analysis	
Approach followed?	Tier 1
Was the uncertainty analysis carried out in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes
Quantitative uncertainty (including LULUCF)	Level = 8.94% Trend = 10.08%
Quantitative uncertainty (excluding LULUCF)	Level = 8.71% Trend = 9.81%

Abbreviations: LULUCF = land use, land-use change and forestry.

Inventory management

14. As indicated in the NIR, Greece has a centralized archiving system, which includes the archiving of disaggregated emission factors (EFs) and activity data (AD), and documentation on how these factors and data have been generated and aggregated for the preparation of the inventory. Although MEECC has overall responsibility for inventory management, including the archiving of inventory information, in practice, NTUA archives all inventory information, organized into the following three master folders: an input data file that includes all initial information received from data providers, such as dis ggregated EFs and AD, and documentation on how these factors and data have been generated and aggregated for the preparation of the inventory; a centralized inventory file that includes calculation sheets and related documentation; and a master file that includes internal documentation on QA/QC procedures, external and internal reviews, and documentation on annual key categories and key category identification and planned inventory improvements.

4. Follow-up to previous reviews

15. The ERT noted that most of the recommendations made in the previous review report have not been addressed in the 2013 annual submission, owing to the late finalization of the 2012 annual review report, published in May 2013. In response to questions raised by the ERT during the review, Greece also provided an overview of ongoing and planned

actions initiated due to the recommendations made in the previous review report. The ERT recommends that Greece fully implement the recommendations made in the previous review report, including:

(a) Reallocating emissions from ammonia production to the corresponding category in the industrial processes sector for the years 1990–1993 and 1995–1998 (see paras. 24, 37 and 38 below);

(b) Providing explanations for the recalculations in the NIR and in CRF table 8(b) (see paras. 25 and 63 below);

(c) Strengthening the institutional arrangements with data providers, in particular with EL.STAT and the association of fertilizer producers and dealers, regarding the data on mineral fertilizer consumption used in the N_2O emission estimates for agricultural soils (see para. 48 below);

(d) Including, in a tabular format, the status of surveys and/or monitoring projects on forest activities carried out in the country, detailing how the outcomes have been used for reporting purposes (see para. 57 below);

(e) Strengthening the QA/QC procedures, among others, to ensure the accuracy and consistency of the information in the NIR and the CRF tables (see paras. 61, 78 and 81 below);

(f) Verifying the results of the carbon stock change method through the application of the Intergovernmental Panel on Climate Change (IPCC) gain–loss method (see para. 66 below);

(g) Collecting country-specific data on relevant parameters in order to apply higher tier methods to the calculation of the carbon stock changes in the above- and below-ground biomass pools in land converted to forest land (see para. 67 below).

16. The ERT noted that Greece has implemented a number of improvements in response to the recommendations in the previous review report and commends the Party for its efforts to improve the inventory on the basis of feedback from the review process. The improvements carried out by the Party in the 2013 annual submission include:

(a) The collection of new data to evaluate the total amount of imported foam under the subcategory foam blowing (under the category consumption of halocarbons and SF_6) (see para. 36 below);

(b) The application of a default transition period of 20 years to estimate the carbon stock changes in mineral soils for the land-use conversion categories (see para. 63 below);

(c) The disaggregation of the area of forest land remaining forest land (see para. 64 below);

(d) The inclusion of estimates of CH_4 and N_2O emissions from waste composting for the first time (see para. 74 below);

(e) The provision of transparent and verifiable information demonstrating that litter and dead wood are not net sources under afforestation and reforestation (see para. 84 below);

(f) The reporting of the carbon stock changes in the litter, dead wood and soil carbon pools under deforestation (see para. 87 below).

5. Areas for further improvement identified by the expert review team

17. During the review, the ERT identified a number of areas for improvement, including some related to specific categories. These are listed in the relevant chapters of this report and in table 8.

B. Energy

1. Sector overview

18. The energy sector is the main sector in the GHG inventory of Greece. In 2011, emissions from the energy sector amounted to 92,165.18 Gg CO_2 eq, or 80.1 per cent of the total GHG emissions. Since 1990, emissions have increased by 19.4 per cent, peaking in 2007 when total sectoral emissions amounted to 107,436.55 Gg CO_2 eq (an increase of 39.2 per cent since 1990). The key driver for the rise in emissions between 1990 and 2007 is the general economic growth; more specifically, the growth of the service sector and improvements in living standards. Since 2008, emissions have decreased as a result of the economic crisis, the impact of energy efficiency measures, improved road infrastructure and public transportation, and the introduction of renewable energy sources and natural gas in the electricity production system. In 2011, within the sector, 58.6 per cent of the emissions were from energy industries, followed by 22.0 per cent from transport, 12.0 per cent from other sectors (fuel combustion) and 5.8 per cent from manufacturing industries and construction. The remaining 1.6 per cent were from fugitive emissions from fuels. The only source included in the category other is consumption of liquid fuel by the military. For confidentiality reasons, military fuel use is not reported separately under the category other (fuel combustion) but included under the corresponding categories in the energy sector.

19. Greece has reported an uncertainty analysis for the estimation of all GHG emissions under the energy sector based on the tier 1 method provided in the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance). The background information on those uncertainties is provided in the respective category sections in the NIR. Greece stated that the uncertainty related to the estimation of emissions from categories under stationary combustion is relatively small (less than 5 per cent) as the AD obtained from the national energy balance were cross-checked with data from the verified European Union emissions trading scheme (EU ETS) reports on the basis of plant-specific data. The uncertainty analysis for other (fuel combustion) is mainly based on the default uncertainties provided in the IPCC good practice guidance. For fugitives emissions, the AD, which are based on the energy balance and data collected from plants, the uncertainty is relatively low (5 per cent) while the uncertainty associated to the default EF is very high (300 per cent).

2. Reference and sectoral approaches

20. Table 5 provides a review of the information reported under the reference approach and the sectoral approach, as well as comparisons with other sources of international data. Issues identified in table 5 are more fully elaborated in paragraphs 21–24 below.

Table 5
Review of reference and sectoral approaches

		Paragraph cross-references
Difference between the reference approach and the sectoral approach	Energy consumption: –2.66 PJ, –0.25%	

		Paragraph cross-references
	CO_2 emissions: 546.26 Gg CO_2 eq, 0.61%	
Are differences between the reference approach and the sectoral approach adequately explained in the NIR and the CRF tables?	Yes	21
Are differences with international statistics adequately explained?	Yes	22
Is reporting of bunker fuels in accordance with the UNFCCC reporting guidelines?	Yes	23
Is reporting of feedstocks and non-energy use of fuels in accordance with the UNFCCC reporting guidelines?	No	24

Abbreviations: CRF = common reporting format, NIR = national inventory report, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

Comparison of the reference approach with the sectoral approach and international statistics

21. For 2011, CO_2 emissions estimated using the sectoral approach were 0.61 per cent lower than those estimated using the reference approach, while energy consumption for the sectoral approach was 0.25 per cent higher than the energy consumption for the reference approach. In the NIR, Greece explained that the numerical differences between the reference approach and the sectoral approach data can be explained by the statistical differences in fuel consumption: the sectoral approach uses the actual consumption of the different fuels, while the reference approach uses their apparent consumption (by the losses from transformation, transport and distribution of crude oil and by natural gas losses which are not taken into account in the reference approach) and by the EFs applied in the sectoral approach which are different to those applied in the reference approach.

22. The ERT noted that there were differences between the reported net calorific values (NCVs) and those in the International Energy Agency (IEA) reports. In response to previous review stages in 2013, Greece explained that the NCVs used by the inventory team are based on plant-specific AD and obtained from EU ETS reports instead of energy balance data and consequently they are different from those used by the IEA. The ERT recommends that Greece provide a detailed comparison between the NCVs used by the IEA and those used by the inventory team in the reference approach of the annual inventory submission, as well as the specific AD obtained from the verified EU ETS reports, in a tabular format, in order to improve the transparency of its reporting.

International bunker fuels

23. Greece explained in the NIR that the GHG emissions from domestic and international navigation are estimated based on the national energy balance and using a tier 1 approach. The GHG emissions from international aviation and domestic aviation are estimated according to the tier 2 approach by using landing/take-off data from the Civil Aviation Organization. In response to a question raised by the ERT during the review, the Party further explained that the separation of fuel consumption between international and national use is performed by the entity responsible for compiling the national energy

balance (MEECC) based on surveys and data gathered from all companies operating in Greece that supply fuel for aviation and navigation use. The ERT recommends that, in order to improve the transparency of its reporting, Greece provide, in the NIR of its next annual submission, an explanation of how in the energy balance the annual fuel consumption for domestic transport is separated from the consumption for international transport based on the fuel supply data from supplier companies, in order to demonstrate the accuracy of its emission estimates for domestic aviation and navigation.

Feedstocks and non-energy use of fuels

24. Greece explained in the NIR that data on the non-energy use of fuels are derived from the national energy balance and from plant-specific data from the verified EU ETS reports. The emissions from fuel combustion are attributed to the energy sector while the emissions from production processes (i.e. ammonia and hydrogen production) are attributed to the industrial processes sector, with the exception of liquid fuels used as feedstock in ammonia production for the years 1990–1993 and 1995–1998, which are included under the energy sector. The ERT reiterates the recommendation from the previous review report that Greece, in its next annual submission, reallocate emissions from liquid fuels used as feedstock in ammonia production from the energy sector to the corresponding category in the industrial processes sector for the years 1990–1993 and 1995–1998, in order to ensure that its reporting is in line with the IPCC good practice guidance.

3. Key categories

Road transportation: liquid, gaseous fuels and biomass – CO_2, CH_4 and N_2O[3]

25. Greece explained in the NIR (page 113) that the estimation of emissions of CO_2 from road transportation is based on the fuel consumption (gasoline, diesel, liquefied petroleum gas and natural gas) included in the energy balance. For the emissions of CH_4 and N_2O from road transportation a new version of COPERT was applied. The use of lubricants in road transportation was estimated based on lubricant consumption according to the national energy balance, and Greece explained in the NIR that it no longer uses a proxy bottom-up calculation for the amount of lubricant consumed. In the NIR, Greece reported that the lubricant consumption was estimated from the energy balance by applying a fuel consumption ratio that the Party considered reliable (0.0035), but the explanation in the NIR is not clear enough to indicate, for example, whether it relates to the recalculations for the previous years or not. The ERT commends Greece for implementing the recommendation from the previous review report. However, the ERT recommends that Greece improve the description of the recalculations for the whole time series resulting from this change in method as well as the description of the calculation for the fuel consumption ratio of lubricants in road transportation in order to justify the time-series consistency in estimating emissions from this category.

26. Greece has reported that the planned improvements related to the reconstruction for the whole time series of the fleet population and the composition database for road transportation is ongoing. In addition, the Party expects that measures to reduce the illegal use of fuels and the smuggling of fuels will make the statistical data on energy consumption more reliable. The ERT recommends that Greece complete its improvement plan and reflect any updates in the AD related to this category in its next annual submission.

[3] Not all emissions related to all gases under this category are key categories, particularly CH_4 and N_2O emissions. However, since the calculation procedures for issues related to this category are discussed as a whole, the individual gases are not assessed in separate sections.

Navigation: liquid fuels – CO_2, CH_4 and N_2O[4]

27. The ERT noted inter-annual fluctuations in the consumption of fuel (in TJ) in domestic navigation throughout the time series. For example, the inter-annual changes in fuel consumption in the following years are relatively high: 1994/1995 (–14.4 per cent), 1996/1997 (+21.1 per cent), 1997/1998 (+53.7 per cent), 1999/2000 (–42.1 per cent), 2000/2001 (+35.3 per cent), 2008/2009 (+46.8 per cent) and 2009/2010 (–18.1 per cent). However, the values remained relatively stable for 2010/2011 (an increase since 2010 of 0.3 per cent). The share of GHG emissions from domestic navigation in the transport sector also fluctuated from 9 to 15 per cent throughout the time series, amounting to 11 per cent for 2011. The ERT recommends that Greece explain the cause of this fluctuation.

28. Greece reported in the NIR that a tier 1 method and default EF from the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (hereinafter referred to as the Revised 1996 IPCC Guidelines) were used to estimate the CO_2 emissions. The default method from CORINAIR was used for the CH_4 and N_2O emission estimates. In the NIR, Greece explained that the application of a higher tier method was not possible due to the absence of detailed data on the composition of the fleet and the routes performed. Further, Greece stated in the NIR that the possibility of obtaining detailed fleet data for use in the emission estimates is limited. In response to a question raised by the ERT during the review, Greece confirmed that the only variable taken into account in the emission estimates is fuel consumption. The IPCC good practice guidance (page 2.54) indicates a list of several likely sources for the AD and the use of their combination to obtain "a full coverage of shipping activities". The ERT reiterates the recommendation made in the previous review report that Greece start a process aimed at providing, in future annual submissions, a more accurate estimate of CO_2 emissions associated with this category by gathering information on the number of arrivals and departures, destination and fleet composition and, if necessary, take into consideration the experiences of other Parties in gathering these data.

Coal mining and handling – CH_4

29. In Greece, all coal mines are surface mines. In 2011, fugitive CH_4 emissions from lignite amounted to 1.3 per cent of total GHG emissions from the energy sector, and were considered to be a key category. The emission estimates were calculated using a tier 1 method and a default EF of 1.01 kg CH_4/t lignite produced, as recommended by the IPCC good practice guidance (= 1.5 m^3 CH_4/t lignite × 0.67 kg CH_4/m^3 CH_4), since a country-specific EF for use in a tier 2 method is not available. Greece is of the view that the use of a tier 1 method and default EF is a conservative approach, following its examination of the implied emission factors (IEFs) of Germany (0.011 kg CH_4/t lignite produced), Poland (0.01 kg CH_4/t lignite produced) and Spain (0.31 kg CH_4/t lignite produced) (including mining and post-mining activities), all of which use a tier 2 method. However, the ERT notes that it is good practice to avoid under- and overestimates as far as practicable, and not only to be conservative. In response to a question raised by the ERT during the review, Greece informed the ERT that a bilateral QA exercise was planned in October 2013 with the inventory team of Spain that applied a tier 2 method for coal surface mining. The ERT welcomes this bilateral QA exercise and recommends that Greece report any progress for the estimates of CH_4 emissions from this category resulted from this bilateral QA exercise in its next annual submission.

[4] Not all emissions related to all gases under this category are key categories, particularly CH_4 and N_2O emissions. However, since the calculation procedures for issues related to this category are discussed as a whole, the individual gases are not assessed in separate sections.

4. Non-key categories

Fugitive emissions: oil and natural gas – CO_2, CH_4 and N_2O

30. GHG emissions from this category accounted for 0.2 per cent (198.52 Gg CO_2 eq) of the emissions from the energy sector, and had increased by 22.5 per cent compared with 1990. Greece states in the NIR that the natural gas system is in progress and the emissions are expected to increase in the future. The ERT encourages Greece to consider the qualitative criteria for this category in determining key categories, as described in the IPCC good practice guidance (page 7.13) for applying in the future a methodology related to a key category.

C. Industrial processes and solvent and other product use

1. Sector overview

31. In 2011, emissions from the industrial processes sector amounted to 8,893.78 Gg CO_2 eq, or 7.7 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 316.41 Gg CO_2 eq, or 0.3 per cent of total GHG emissions. Since 1990, emissions have decreased by 11.7 per cent in the industrial processes sector, and increased by 2.6 per cent in the solvent and other product use sector. The key drivers for the fall in emissions in the industrial processes sector are the decrease in mineral production, mainly due to a 57.6 per cent decrease in clinker production and a decrease in lime production of 89.4 per cent, and the decrease in CO_2 emissions from hydrogen production for the years since 1997. In 2011, within the industrial processes sector, 39.9 per cent of the emissions were from consumption of halocarbons and SF_6, followed by 35.0 per cent from mineral products, 13.1 per cent from metal production and 11.9 per cent from chemical industry.

32. Greece has not reported information on existing and/or planned abatement technologies for aluminium production and nitric acid production to reduce emissions from these two categories, which is not in line with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. In the NIR, Greece explained that for nitric acid production, the abatement system used by the Greek installations to reduce nitrogen oxides (NO_X) emissions is an absorption tower, which does not affect the N_2O emissions. However, the Party recognizes that the plants intend to implement some form of abatement technique in the future. For aluminium production, Greece reported in the NIR that the relevant data are obtained directly from the plants and are considered to be confidential. The ERT recommends that Greece obtain information on the abatement technologies used in those industries and incorporate that information in its reporting of emissions from those categories in its next annual submission.

33. Potential emissions of fluorinated gas (F-gases) have not been estimated per gas type and per subcategory (see CRF table 2(I)), or as aggregated emissions due to a lack of data as indicated in the CRF, and have therefore been reported as "NE" (not estimated). In response to a question raised by the ERT during the review, Greece informed the ERT that the actual emissions of F-gases are estimated based on data on imports and exports of F-gases (in bulk) collected by EL.STAT. A tier 2a method provided in the IPCC good practice guidance, a bottom-up approach based on detailed equipment data and EFs representing various types of leakage per equipment category were used to estimate the emissions from this category. In addition, in response to a question raised by the ERT during the review, Greece explained that a questionnaire on the quantities of F-gases imported, exported and sold per blend was sent to the members of the National Association of Refrigeration Importing & Trading Companies in 2012, in accordance with the inventory improvement plan. However, the Party also explained that since only 50 per cent of those companies have responded to the questionnaire, the data collected thus far have not been

used in the 2013 annual inventory submission to avoid an underestimation of emissions. Greece also explained that following the entry into force of EC Regulation No. 842/2006, Common Ministerial Decision No. 18694 was published in Greece on 11 April 2012, which defines data collection procedures regarding the enterprises that produce, import, export, recover, recycle and trade F-gases on an annual basis until the end of March every year. As a result of this new development, reporting of potential emissions of F-gases is planned for the 2014 annual submission. The ERT recommends that Greece continue to collect the data necessary to estimate potential emissions of F-gases per gas type as an integral part of its inventory improvements plan.

34. The ERT noted some discrepancies and errors in the use of the notation keys in the CRF tables for several categories and subcategories for some years of the time series, including asphalt roofing and road paving with asphalt (mineral products), aluminium production (metal production), ethylene, dichloroethane (chemical industry) and consumption of halocarbons and SF_6. For example, some of the F-gas emissions (octafluoropropane (C_3F_8), perfluorobutane (C_4F_{10}), octafluorocyclobutane (c-C_4F_8), nonafluoro-2-(trifluoromethyl)butane (C_5F_{12}) and perfluorohexane (C_6F_{14})) from aluminium production for the period 1990–2003 have been reported as "NE", while the notation key "NA" (not applicable) has been reported for the other years of the time series. In response to a question raised by the ERT during the previous review, the Party explained that the notation key "NA" should be reported for all years of the time series. However, this has not been corrected in the 2013 submission. The ERT recommends that Greece improve its QA/QC procedures to ensure accuracy and consistency in the use of the notation keys in its next annual submission.

2. Key categories

Cement production – CO_2

35. Greece explained in the NIR that emissions from non-carbonate carbon have been taken into account only for the recent years of the time series (2008 onwards). The Party further explained that the examination of whether or not emissions from non-carbonate carbon have been omitted from the emission estimates for the years prior to 2008 is ongoing. Greece also has explained that all seven plants reporting the use of total organic carbon (TOC) since 2008 were contacted in order to clarify whether TOC was also used prior to 2008, or whether it has been introduced into the process since 2008. However, the data collection has not yet been completed. The ERT recommends that Greece complete its data collection for the whole time series and reflect the results in the inventory reporting in its next annual submission.

Consumption of halocarbons and SF_6 – HFCs

36. In response to a recommendation from the previous review report that the Party include estimates of HFC emissions from imported foam (foam blowing), Greece conducted a survey to collect data from the industry association PanHellenic Association of Insulating Companies. The results of the survey indicate that the members of the PanHellenic Association of Insulating Companies either do not import foam products (because they fulfil their needs from the Greek market) or they import foam products that are free of HFCs and instead contain other environmentally friendly gases, such as air, as cell gas. The ERT commends the efforts made by Greece to improve the completeness of its reporting. However, noting that Greece explained that only 20 per cent of the association members responded to the survey, the ERT strongly recommends that the Party continue its efforts to collect data on HFC emissions from imported foam, and provide information on the progress made and results obtained in the next annual submission.

3. Non-key categories

Ammonia production – CO_2

37. In its NIR, Greece has reported on its efforts to estimate the liquid fuel used as feedstock for ammonia production in the early years of the time series. In response to a question raised by the ERT during the review, the Party explained that the one plant using liquid fuels in Greece has now ceased operation and no information is yet available about the type of fuel that was used from 1995 to 1999. Greece also informed the ERT about its ongoing research on the quantification of liquid fuel consumed using the available data for those years, which is based on the amount of ammonia produced (in kt) to obtain the total fuel requirements, carbon content factors and associated information, in order to achieve accurate emission estimates. The ERT commends Greece for its efforts to improve the accuracy of the emission estimates for this category and recommends that the Party complete the ongoing work to obtain more accurate data on the amount of liquid fuel used as feedstock and use the updated AD in the emission estimates in its next annual submission.

38. The ERT noted that emissions from this category were reported as "NO" (not occurring) in 1994 and as "IE" (included elsewhere) in 1995–1997 with no explanation in CRF table 9(a). In response to a question raised by the ERT during the review week, Greece informed the ERT that the emissions estimation for the years 1995–1999 were included in the emissions from chemicals (manufacturing industries and constructions) under the energy sector – liquid fuels. The ERT recommends that Greece update its CRF tables in its next submission.

Consumption of halocarbons and SF_6 – SF_6

39. In CRF table 2(II).F Greece has reported SF_6 emissions from installation losses for high-voltage switchgear used in the country under the subcategory electrical equipment. These emissions should be reported as emissions "from manufacturing", in accordance with the IPCC good practice guidance. However, Greece has used the notation key "IE" to report emissions "from manufacturing", and has reported the total emissions as the emissions "from stocks". In response to a question raised by the ERT during the review, Greece informed the ERT that the emissions were estimated on the basis of the quantity of SF_6 consumed during the year according to the information provided by the Public Power Corporation. The method uses the weighting of the compressed SF_6 cylinder before and after the filling of the equipment, but the amount reported by the Public Power Corporation each year refers only to the gas escaped, and emissions from the filling of new equipment are not included. The ERT strongly recommends that Greece provide additional information on the method used to estimate SF_6 emissions in its next annual submission, in order to improve the transparency of its reporting.

D. Agriculture

1. Sector overview

40. In 2011, emissions from the agriculture sector amounted to 8,965.84 Gg CO_2 eq, or 7.8 per cent of total GHG emissions. Since 1990, emissions have decreased by 21.8 per cent. The key driver for the fall in emissions is the decrease in the consumption of nitrogen (N) in mineral fertilizer. Within the sector, 55.5 per cent of the emissions were from agricultural soils, followed by 36.0 per cent from enteric fermentation and 6.7 per cent from manure management. Rice cultivation accounted for 1.3 per cent and field burning of agricultural residues accounted for 0.5 per cent.

41. Greece has not made recalculations for the agriculture sector between the 2012 and 2013 annual submissions. In response to a recommendation in the previous review report, Greece avoided recalculation due to the use of three-year averages of AD. Recalculations will be only done in the case of changes of AD. The ERT commends Greece for this improvement.

42. The inventory for the agriculture sector is complete and includes estimates for all gases and for all categories for the whole time series. The ERT considers that the transparency of the NIR requires further improvement (see paras. 47 and 51 below).

43. The ERT notes that, in the NIR, uncertainty estimates have been provided for all categories of the sector. The ERT commends Greece for its efforts to improve the quality of its GHG inventory and appreciates the arrangement of a bilateral QA exercise (independent review of sector agriculture) with the Spanish inventory team planned for October 2013.

44. Greece has used provisional data for some AD, including the dairy cattle population and milk yield data. In response to a question raised by the ERT during the review, the Party explained that provisional data have been developed by the agriculture expert of the inventory team in collaboration with the EL.STAT experts following a regression analysis. This approach had to be adopted due to a delay in data delivery by EL.STAT, which was mainly attributed to administrative structural changes carried out by EL.STAT over the last three years. Greece explained that AD for at least two additional years of the time series will be available for use in its next annual submission, provided that the technical difficulties involved in the operation of EL.STAT are resolved. The ERT recommends that Greece obtain actual statistical data, especially for the key categories, for all years of the time series for use in the calculation of the emission estimates in its next annual submission. If this is not feasible, the ERT recommends that Greece provide, in its next annual submission, a more detailed explanation of the provisional data used for the emission estimates, including the methods used to develop those data, in order to improve the transparency of its reporting.

45. For 2011, some animal population data used in the inventory deviate significantly from the data provided by the Food and Agriculture Organization of the United Nations (FAO). In particular, the livestock population for swine used for the inventory (869,000) is much lower (–27.6 per cent) than the number provided by FAO (1,109,000). The cattle population used for the inventory was 4.4 per cent higher than the figure provided by FAO, while the sheep population was 1.5 per cent lower than the figure provided by FAO. In response to a question raised by the ERT during the review, Greece explained that there are no official data for recent years; as explained in paragraph 44 above, provisional data are presented from both the Greek inventory team and FAO. However, Greece considers that the provisional FAO data are implausible and deviate significantly from the historical trend, whereas the data presented in the NIR are relatively consistent. The ERT accepted the explanation of Greece but reiterates the recommendation made in paragraph 44 above in order to improve the transparency and accuracy of the Party's inventory.

2. Key categories

Enteric fermentation – CH_4

46. For the estimation of CH_4 emissions from dairy cattle, Greece used the IPCC tier 2 method. For the methane conversion rate (Y_m) the IPCC default value of 0.06 was used and for digestibility of feed the IPCC default value of 60 per cent for Mediterranean conditions was used. However, as already pointed out in the previous review report, the ERT is of the view that this value is too low when compared with the level of Greek milk production. In response to a question raised by the ERT during the review, the Party informed the ERT that Greece is currently investigating information on national feeding conditions which is

available in Greek institutes holding specific expertise in these issues (e.g. the Agricultural University of Athens, the Ministry of Rural Development and Food, the Department of Animal Production at the School of Agricultural Technology (Technological Educational Institute of Epirus) and the Office of Rural Development of the Prefecture of Thessaloniki). Greece plans to present the results in the NIR of its next annual submission. The ERT commends Greece for starting the above-mentioned work and recommends that the Party conclude its investigations and develop representative country-specific values for the next annual submission.

47. CH_4 emissions from sheep were calculated using the IPCC tier 2 method. In response to a question raised by the ERT during the review regarding milk production data of sheep, Greece explained that annual official statistics on the total milk production of sheep were used as the basis for the emission estimates and that there are no official data available concerning milk production per ewe for different types of sheep. Average milk production data for domestic sheep (0.22 kg/day) and nomadic sheep (0.20 kg/day), which are based on expert judgement, are used to derive the fractions of the domestic and nomadic sheep populations only. The ERT strongly recommends that Greece provide, in the NIR, a better explanation of the AD used for the inventory in order to improve the transparency of its reporting in the next annual submission. In particular, the ERT recommends that the Party provide a more appropriate explanation for the use of different milk production data, the generation of AD for the nomadic and domestic sheep populations and the input data used for the emission calculations. The ERT also recommends that Greece provide clear references for the data sources for all parameters, presented in formulae and tables of the NIR in its next annual submission.

Agricultural soils – N_2O

48. Greece has estimated N_2O emissions from agricultural soils using the tier 1a and 1b methods from the IPCC good practice guidance in combination with country-specific and IPCC default data.

49. Greece has reported in the NIR that the AD for mineral fertilizer consumption are derived from the Pan-Hellenic Association of Professional Fertilizer Producers & Dealers (PHAPFDP). However, no further information is provided in the NIR on, for example, how the data have been collected, how sales and purchases from non-members of PHAPFDP have been estimated, and how local unregistered imports are treated. The ERT strongly recommends that Greece document in the NIR the completeness of the AD and reiterates the recommendation made in the previous review report that Greece strengthen its arrangements with data providers, primarily with EL.STAT and secondarily with PHAPFDP, with regard to data delivery, including documentation on how the data set has been elaborated.

3. Non-key categories

Manure management – CH_4 and N_2O

50. Greece used a IPCC tier 2 method to calculate CH_4 emissions from dairy cattle, other cattle and sheep. For all other animal categories, a tier 1 method was used.

51. Greece has applied a country-specific AWMS distribution for cattle and swine for the first time in its 2013 annual submission. In developing the AWMS distribution, assumptions were made based on discussions with experts from the Ministry of Rural Development and Food, the Greek regions with a high population of dairy cattle farms, the Agricultural University of Athens, EL.STAT and the Technological Educational Institute of Thessaloniki. However, the background information used in the expert judgement is not clearly explained in the NIR. In response to a question raised by the ERT during the review,

Greece explained that the AWMS distribution based on the data collected since 2000 was applied for the entire time series using the assumption that the same situation occurred for the whole times series (1990–2011). Greece also explained that it is difficult to obtain data for the period 1990–2000 because the information has mostly been collected during the years since 2000. The ERT commends the Party for its efforts to develop a country-specific AWMS distribution and recommends that Greece continue its efforts to further refine the appropriate parameters for the entire time series. The ERT also reiterates the recommendation made in the previous review report that Greece investigate the distribution of AWMS for all animal types in detail and update the information in its next annual submission.

52. Within the liquid management system for dairy cattle the separation of solids is common practice in Greece. In response to a question raised by the ERT during the review, Greece explained that, according to the expert judgement of the Ministry of Rural Development and Food, about 15 per cent of the amount of volatile solids (VS) excreted by dairy cattle in liquid-solid separation systems is treated by applying liquid practices, which means that it is drifted by the liquid and stored in tanks. The rest is separated and treated according to solid practices. Given that 8 per cent of the total VS excretion of dairy cattle is excreted outside the housings (on pasture/range/paddock) and 40 per cent of the excretion in dairy housings is treated by manure separation, the fraction of VS managed according to liquid practices has been calculated as follows: 92 per cent × 40 per cent × 15 per cent = 5.52 per cent, which corresponds to the value provided in CRF table 4.B(a) for liquid systems for dairy cattle. The ERT recommends that Greece include the shares of VS excretion per AWMS, as provided in CRF table 4.B(a), in the NIR of its next annual submission to improve the description of the method used, in particular for the expert judgement, in order to justify the expert judgement used.

53. The ERT noted that Greece has reported in CRF table 4.B(a) the AWMS distribution data for 2011 only. The MCF for cattle, swine and sheep has been reported as "NA", "NE" or 0.0 for 2011. For the other years of the time series, 0.0 has been reported for all relevant cells. In response to a question raised by the ERT during the review, Greece explained that a software problem might have occurred and that the data might therefore have been incorrectly inputted. The ERT recommends that Greece identify the cause of this error, correct the software problem, if appropriate, and report the correct data for the entire time series in its next annual submission.

54. In Greece's inventory, manure separation in dairy cattle husbandry results in different allocations to liquid and solid systems and is therefore reported in CRF table 4.B(a) under CH_4 emissions and in CRF table 4.B(b) under N_2O emissions from manure management. According to the IPCC good practice guidance (page 4.44), as a rule of thumb, 50 per cent of the N excreted is in the dung and 50 per cent of the N excreted is in the urine. Following the assumption that in liquid-solid separation only 15 per cent of the solids are drifted by the liquid, the resulting share of N treated according to liquid practices has been calculated as follows: 92 per cent × 40 per cent × (50 per cent + 50 per cent × 15 per cent) = 21.2 per cent, which corresponds to the N fraction provided in CRF table 4.B(b) for liquid systems for dairy cattle. To improve transparency of the inventory, the ERT strongly recommends that Greece improve the description of the method used to derive the AWMS fractions (liquid and solid systems) from manure separation for the estimation of both CH_4 and N_2O emissions in the relevant subcategories under manure management in the NIR of its next annual submission.

E. Land use, land-use change and forestry

1. Sector overview

55. In 2011, net removals from the LULUCF sector amounted to 2,539.59 Gg CO_2 eq. Since 1990, net removals have shown a relative increase of 1.7 per cent. The key driver for the rise in removals is the increase in carbon stocks in the living biomass pool in forest land. Within the sector, forest land accounted for net removals of 2,127.49 CO_2 eq, followed by cropland accounting for net removals of 470.92 Gg CO_2 eq. Net emissions from other land accounted for 35.45 Gg CO_2 eq, followed by grassland accounting for net emissions of 17.65 Gg CO_2 eq. Net emissions from settlements and wetlands accounted for 5.57 Gg CO_2 eq and 0.15 Gg CO_2 eq, respectively.

56. Greece provided a land-use change matrix showing only the land-use changes for the period 1990–2011. However, annual land-use change matrices showing the annual land-use changes have not been provided in the NIR. It is therefore not transparent how Greece has developed the annual land-use change matrices, or indeed whether or not the Party has actually developed the annual land-use change matrices. The ERT recommends that Greece provide transparent information on how the annual land-use change matrices have been developed and report a complete set of annual land-use change matrices for the period 1990–2012 in its next annual submission.

57. Greece's inventory for the LULUCF sector is generally transparent and the NIR provides detailed information on the methods, assumptions, AD and their sources, EFs and other parameters used in most cases. In response to a recommendation in the previous review report, Greece has reported detailed information on the different data sources used for the classification of land use and land-use changes in the NIR in a table, including details of the data sources used, their content and the land-use category for which they have been used. The ERT commends Greece for the implementation of this recommendation. In the previous review report it was also recommended that the Party increase the transparency of its reporting by including, in a tabular format, the status of surveys and/or monitoring projects on forest activities carried out in the country, detailing how the outcomes have been used for reporting purposes. However, Greece has not provided this information in the 2013 annual submission. The ERT reiterates the recommendation made in the previous review report that Greece improve the transparency of its reporting by providing the above-mentioned information in its next annual submission.

58. Greece has reported in the NIR an equation for estimating the annual increase in carbon stocks due to biomass growth in new plantations, in which the division by ($\lambda i/2$) (where λi is the average replacement cycle of plantation by crop type in years) was performed twice: once to estimate the annual biomass increment per unit area and again to estimate the biomass carbon stock changes, whereas it should only be performed once. In response to a question raised by the ERT during the review, Greece clarified that it was just a typographical error and that the actual calculation was done correctly. The ERT recommends that the Party correct this typographical error in its next annual submission.

59. The LULUCF sector of Greece's inventory is generally complete with only a few pools in the mandatory categories reported as "NE": the carbon stock changes in the living biomass and dead organic matter pools in grassland converted to forest land (see also para. 67 below); the carbon stock changes in living biomass in cropland converted to settlements; the carbon stock changes in soils in grassland converted to settlements; and the carbon stock changes in soils in grassland converted to other land. In response to a question raised by the ERT during the review, Greece clarified that this was due to a lack of sufficient information, including AD, but that it is planning to provide at least some of the missing estimates in its next annual submission. The ERT recommends that Greece make efforts to

collect the necessary information and report the AD and emission/removal estimates for the above-mentioned pools in its next annual submission, or, where applicable, report on the progress made.

60. Greece has performed a tier 1 uncertainty analysis for the LULUCF sector and the results have been presented in the NIR. However, the NIR does not provide detailed information on the uncertainty analysis including the uncertainty values used for AD and EFs and whether those are country-specific or default values. The ERT recommends that Greece provide detailed and transparent information on the uncertainty assessment for the LULUCF sector including the above-mentioned elements in the next annual submission.

61. The Party has provided information on the category-specific QA/QC procedures for the LULUCF sector in the NIR. All the procedures related to QC have been provided, but no details on QA have been provided.The ERT recommends that Greece provide more information on the QA procedures employed for the LULUCF sector.

62. Greece has reported the carbon stock changes in mineral soils in the categories cropland converted to forest land and cropland converted to grassland under the category cropland remaining cropland, and has used the notation key "IE" to report the respective categories in the CRF tables. In the NIR, Greece has reported that the methodology used to represent land areas follows approach 1 from the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF), which does not allow the initial crop type of areas abandoned or aforested to be determined and, therefore, does not allow the carbon stock changes in cropland remaining cropland and cropland converted to grassland or cropland converted to forest land to be reported separately. The ERT reiterates the recommendation made in the previous review report that Greece collect additional information to determine the areas of conversion of cropland to forest land and cropland to grassland by initial crop type, and report the carbon stock changes in mineral soils in the appropriate categories in its next annual submission.

63. Greece reported in the NIR in the 2013 annual submission that, in order to estimate the carbon stock changes in mineral soils for the land-use conversion categories (cropland converted to forest land and cropland converted to grassland), it has used a default transition period of 20 years, including these categories in the estimation methodology for the cropland remaining cropland category. In response to a question raised by the ERT, the Party clarified that it had also used a 20-year transition period for the estimation methodology for these categories in the previous submissions. However, the ERT notes that in the previous review report, while noting that Greece assumes that the carbon stock changes in mineral soils for the land-use conversion categories occur fully in the year after the conversion takes place, a recommendation was made that Greece, in its next annual submission, use a default transition period of 20 years in the estimation process for carbon stock changes in mineral soils for the land-use conversion categories, or demonstrate that the current approach is not overestimating removals or underestimating emissions. The explanation made by the Party in response to the question from the 2013 ERT therefore seems inconsistent with the recommendation made by the previous ERT. The Party has not provided any clarification on this issue in the NIR. The ERT recommends that Greece provide any clarification on its reporting of the carbon stock changes in mineral soils in cropland converted to forest land and cropland converted to grassland and the use of a default transition period of 20 years in the estimation process for carbon stock changes in mineral soils for the land-use conversion categories in its next annual submission.

2. Key categories

Forest land remaining forest land – CO_2

64. Greece has used the results from the Forest Management Plans Database developed by the Ministry of Environment as the primary data source together with the first National Forest Inventory prepared by the General Secretariat of Forests and Natural Environment for the assessment of the forest area. The total area reported under the forest land remaining forest land category in the 2013 annual submission is equal to 3,354.64 kha. Greece has reported for the first time the total area under forest land remaining forest land disaggregated into managed and unmanaged forest areas in the CRF tables: 1,219.15 kha of managed forest areas and 2,135.50 kha of unmanaged forest areas. The ERT commends Greece for implementing the recommendation made in the previous review report to disaggregate the area of forest land remaining forest land.

65. Greece has reported the carbon stock changes in the above- and below-ground biomass pools only, and has reported the carbon stock changes in the dead organic matter and soil carbon pools as "NA", assuming them to be constant according to the tier 1 assumption from the IPCC good practice guidance for LULUCF. In the NIR, and also in response to a request made by the ERT during the review regarding the provision of additional information, the Party reiterated that this assumption is in line with the situation in Greece: forest management activities, such as the silvicultural system, rotation length, harvest practices and site preparation activities do not change significantly over time, and post-logging burning of harvest residues, soil scarification or fertilization are not practised in the country. However, as forest land remaining forest land is a key category, the ERT considers that the use of the tier 1 assumption is not in line with the IPCC good practice for LULUCF. Therefore, the ERT reiterates the recommendation made in the previous review report that Greece either estimate and report the carbon stock changes in the above-mentioned pools or provide evidence transparently substantiating the assertion that the above-mentioned carbon stock changes are zero.

66. Greece has used the carbon stock change method from the IPCC good practice guidance for LULUCF to estimate the carbon stock changes in the above- and below-ground biomass pools in forest land remaining forest land. The ERT notes that the previous review report indicated that a comparison of the reported data with the results from the gain–loss method using the data provided by Greece revealed some unusual values, resulting in a possible overestimation of removals, and strongly recommended that the Party perform a verification of the results using the IPCC gain–loss method. However, no such verification has been reported in the NIR of the 2013 submission and, therefore, the ERT strongly reiterates the recommendation in the previous review report that Greece perform a verification of the results of the carbon stock change method using the IPCC gain–loss method, include the results of this verification in its next annual submission, and revise its estimations, if necessary.

Land converted to forest land – CO_2

67. Greece used a tier 1 method together with default parameters from the IPCC good practice guidance for LULUCF to estimate the carbon stock changes in the above- and below-ground biomass pools for cropland converted to forest land. However, considering that land converted to forest land is a key category, it is good practice to use higher tier methods for the significant pools (e.g. above- and below-ground biomass). In response to a question raised by the ERT during the review, Greece explained that country-specific data are not available, but it acknowledged that moving to a tier 2 methodology will significantly improve the quality of the inventory and stated that efforts will be made to improve data collection. The ERT recommends that Greece collect country-specific data on relevant parameters in order to apply higher tier methods to the estimation of the carbon

stock changes in all significant pools in cropland converted to forest land and report on the progress made in its next annual submission.

68. Greece has reported the carbon stock changes in the dead organic matter as "NO" and "NE", assuming them to be constant according to the tier 1 assumption in the IPCC good practice guidance for LULUCF. In response to a question raised by the ERT during the review, Greece explained that land converted to forest land consists only of cropland converted to forest land. Further, Greece explained that, since cropland holds no dead organic matter, afforestation typically results in small increases in carbon stock in the dead organic matter pools that are difficult to accurately measure. The Party has therefore used the conservative assumption that there is no accumulation of dead wood on land following conversion to forest land and no change in the carbon stock changes in the dead organic matter in cropland converted to forest land. However, the ERT notes that, according to the IPCC good practice guidance for LULUCF, the inventory should be neither underestimated nor overestimated. In addition, since land converted to forest land is a key category, it is good practice to use higher tier methods to estimate the resulting emissions and removals. Therefore, the ERT recommends that Greece collect the necessary information to estimate and report the carbon stock changes in dead organic matter in land converted to forest land using higher tier methods.

69. In estimating the carbon stock changes in the living biomass pool in land converted to forest land, Greece has not taken into account the decrease in carbon stocks due to biomass losses as a result of harvesting, fuel wood gathering and natural disturbance. The NIR states that there has been no harvesting on lands afforested since 1994. However, no explanation or supporting evidence was provided for not taking into account the losses due to natural disturbance. The ERT considers that it is highly unlikely that in almost two decades since afforestation no areas under afforestation have been affected by any sort of natural disturbance (e.g. pest attacks, wind throws, storms) or subject to other biomass losses such as those due to fuel wood gathering. The ERT recommends that Greece either provide revised estimates taking into account the carbon stock losses in the living biomass pool due to natural disturbance and other biomass losses such as those due to fuel wood gathering or provide transparent information substantiating that there have been no losses due to natural disturbance or fuel wood gathering in land converted to forest land in its next annual submission.

3. Non-key categories

Land converted to cropland – CO_2

70. Greece has included in the cropland remaining cropland category the growth in carbon stocks in the above- and below-ground biomass pools in perennial tree crops in land converted to cropland . The ERT noted that this is not in line with the IPCC good practice guidance for LULUCF as it is not transparent. The ERT recommends that Greece report the growth in carbon stocks in the above- and below-ground biomass pools in perennial crops in land converted to cropland in the appropriate category in its next annual submission.

Land converted to cropland – N_2O

71. Greece has reported the areas of forest land converted to cropland and grassland converted to cropland as 0.01 and 0.10 kha, respectively, in CRF table 5.B for 2011. However, in CRF table 5(III), these areas, and consequently the N_2O emissions, have been reported as "NO". In response to a question raised by the ERT during the review, Greece explained that the total areas of forest land converted to cropland and grassland converted to cropland since 1990 are negligible and, consequently, the N_2O emissions from disturbance associated with land-use conversion to cropland are expected to be small. The Party further informed the ERT about its plan to estimate and report the N_2O emissions

from disturbance associated with land-use conversion to cropland in its next annual submission. The ERT recommends that Greece estimate and report the N_2O emissions from disturbance associated with the conversion of forest land and grassland to cropland, and also report the correct numbers for the areas in the CRF tables in its next annual submission.

Land converted to grassland – CO_2

72. Greece has reported 315.21 kha as the area of cropland converted to grassland in 2011 in the CRF tables, of which 30.3 kha was converted in the last year. However, the changes in the living biomass pool for cropland converted to grassland have been reported as "NO". No reason for this has been provided in the NIR. In response to a question raised by the ERT during the review, Greece explained its assumption that the carbon stocks do not change after the conversion of cropland that has been abandoned and taken over by grassland and, hence, the carbon stock changes in the living biomass pool amounted to zero. However, the Party did not provide any evidence to substantiate this assumption. The ERT notes that, according to the IPCC good practice guidance for LULUCF, there will be changes in the carbon stocks in the living biomass pool following the conversion of cropland to grassland. The ERT recommends that Greece estimate and report the above-mentioned carbon stock changes in its next annual submission or otherwise provide evidence to substantiate the assertion that carbon stock changes in the living biomass pool amount to zero for cropland converted to grassland.

F. Waste

1. Sector overview

73. In 2011, emissions from the waste sector amounted to 4,703.81 Gg CO_2 eq, or 4.1 per cent of total GHG emissions. Since 1990, emissions have decreased by 15.6 per cent. The key driver for the decrease in emissions is an increase in the use of aerobic wastewater treatment facilities. In addition, improvements in living standards resulted in an increase of the generated waste and thus of emissions. However, the increase of recycling along with the exploitation of the biogas produced limits the increase of CH_4 emissions. Within the sector, 69.4 per cent of the emissions were from solid waste disposal on land, followed by 30.4 per cent from wastewater handling, 0.1 per cent from waste incineration and 0.1 per cent from waste composting.

74. Greece has estimated and reported the CH_4 and N_2O emissions from waste composting for the first time in the 2013 annual submission. A tier 1 method and default EFs from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines) were used in the estimation. The ERT welcomes the efforts made by Greece to improve the completeness of the inventory.

75. Greece carried out category-specific QC procedures for the waste sector, which include the cross-checking of data, a comparison of data with those of other countries and checking the estimates using different calculation tools. During the review, the ERT noted several inconsistencies in the information in the NIR compared with that provided in the CRF tables (see paras. 79 and 81 below) and errors in the NIR (e.g. table 8.2 shows that country-specific EFs are used for the estimation of CH_4 and N_2O emissions from composting, however the NIR states that IPCC default values are used). The ERT recommends that Greece strengthen its QA/QC procedures to ensure the accuracy and consistency of the information provided in the NIR with that provided in the CRF tables in its future annual submissions.

76. Greece performed a tier 1 uncertainty analysis. Within the waste sector, wastewater handling makes the largest contribution to the uncertainties, both in terms of total national

emissions and the emissions trend. The detailed calculations of uncertainties are provided in Annex IV to the NIR.

2. Key categories

Solid waste disposal on land – CH_4

77. Greece has used a tier 2 first order decay method from the IPCC good practice guidance in its estimation of CH_4 emissions from municipal solid waste, industrial waste, construction and demolition waste and sludge disposed in solid waste disposal sites. Country-specific EFs and parameters as well as IPCC default values were used in the estimation of emissions. In the NIR, Greece explained that historical data on construction and demolition waste were estimated using drivers. However, information on these drivers was not provided in the NIR. In response to a question raised by the ERT during the review, Greece explained that the gross domestic product (GDP) was used as a key driver up to 1995, and for the remaining years of the time series the gross value added (GVA) was used because GVA data are not available for the years prior to 1995. The ERT recommends that Greece provide an explanation of how historical data on the amount of construction and demolition waste are estimated in its next annual submission.

78. Greece reported in the NIR that the fraction of degradable organic carbon dissimilated (DOC_f) for sludge disposed at solid waste disposal sites is 40 per cent and that the sewage sludge remains at wastewater treatment facilities under aerobic conditions with negligible CH_4 production; therefore, a value lower than the default was applied. In response to a question raised by the ERT during the review, Greece explained that there was an error in the NIR and that the default value of 0.6 from the IPCC good practice guidance was used instead of the value 0.4 which was used in the previous annual submissions. The ERT recommends that Greece ensure the accuracy of the information provided in the NIR in its future annual submissions.

79. Greece reported in the NIR that emissions from industrial solid waste and from construction and demolition waste disposed in solid waste disposal sites have been reported for the first time in the 2013 annual submission. However, the ERT noted that CH_4 emissions from construction and demolition waste have been estimated and reported since the 2012 annual submission. In response to a question raised by the ERT during the review, Greece clarified that the emissions from industrial solid waste and from construction and demolition waste disposed in solid waste disposal sites have been reported since the 2012 submission. The ERT recommends that Greece ensure the accuracy of the information provided in the NIR and the consistency with the information provided in the CRF tables in its future annual submissions.

Wastewater handling – CH_4 and N_2O[5]

80. Greece estimated and reported CH_4 and N_2O emissions from domestic and industrial wastewater handling. CH_4 emissions from wastewater handling is a key category by both level and trend assessments. The descriptions of the methods and data used are generally transparent. However, the ERT considers that wastewater treatment and discharge pathways, including treatment of the sludge produced from domestic and industrial wastewater handling, are not described in a transparent manner. Therefore, the ERT recommends that Greece provide detailed information on wastewater flows and treatment systems,

[5] Not all emissions related to all gases under this category are key categories, particularly N_2O emissions. However, since the calculation procedures for issues related to this category are discussed as a whole, the individual gases are not assessed in separate sections.

using figure 5.3 from the IPCC good practice guidance as a guide, in the next annual submission, in order to improve transparency.

81. Greece reported in the NIR that recalculations were performed for CH_4 and N_2O emissions from commercial wastewater handling and CH_4 emissions from sludge generated in industrial wastewater handling due to the use of country-specific factors. However, no explanation has been provided in the CRF tables on the recalculations for sludge generated in industrial wastewater handling and commercial wastewater. In response to a question raised by the ERT during the review, Greece explained that the recalculations were performed for CH_4 emissions from domestic wastewater due to the use of updated data on the population for 2010 and for N_2O emissions from domestic wastewater handling due to the use of updated data on annual protein consumption for the period 2008–2010 from EL.STAT. The ERT recommends that Greece ensure the accuracy of the information provided in the NIR and the consistency with the information provided in the CRF tables in its future annual submissions.

3. Non-key categories

Waste incineration – CO_2, CH_4 and N_2O

82. Greece recalculated CO_2, CH_4 and N_2O emissions from waste incineration due to the use of updated AD for 2010. Data on clinical waste incinerated were provided by the Association of Communities and Municipalities of the Attica Region and data on biogenic agricultural residues and industrial chemical waste were provided by EL.STAT. CO_2 emissions from clinical waste and industrial chemical waste were estimated using the default method from the IPCC good practice guidance together with default and country-specific parameters. The Party did not provide documentation in the NIR on the country-specific EFs used for the CH_4 and N_2O emission estimates. The ERT recommends that Greece provide more information in its next annual submission to improve the transparency of its reporting.

G. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol

1. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Overview

83. Table 6 provides an overview of the information reported and parameters selected by Greece under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 6
Supplementary information reported under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

		Findings and recommendations
Has the Party reported information in accordance with the requirements in paragraphs 5–9 of the annex to decision 15/CMP.1?	Not sufficient	The information provided by the Party is generally in line with the requirements in paragraphs 5–9 of the annex to decision 15/CMP.1. However, the information provided by the Party in accordance with paragraph 8(b) of the annex to decision 15/CMP.1 is insufficient. Greece does not have a fully developed system of tracking lands that have temporarily lost forest cover but are not classified as deforested. The ERT recommends that Greece collect the required information and provide it in its next annual submission (see para. 86 below)

		Findings and recommendations
Identify any elected activities under Article 3, paragraph 4, of the Kyoto Protocol	Activities elected: forest management	The recommendation from the previous review report that Greece verify the results of its carbon stock change method that could result in a potential overestimation of removals, through the application of the IPCC gain–loss method has not been implemented by the Party in its 2012 annual submission. The ERT reiterates the recommendation that Greece conduct the above-mentioned verification and include the results of this activity in its next annual submission (see para. 89 below)
	Years reported: 2008–2011	
Identify the period of accounting	Commitment period accounting	
Assessment of the Party's ability to identify areas of land and areas of land-use change	Sufficient	Greece is able to identify areas of land and land-use change in line with the requirements of decision 15/CMP.1

Abbreviations: ERT = expert review team, IPCC = Intergovernmental Panel on Climate Change.

Activities under Article 3, paragraph 3, of the Kyoto Protocol

Afforestation and reforestation – CO_2

84. Greece has reported the carbon stock changes in the above- and below-ground biomass pools, while the carbon stock changes in the dead wood and litter pools have been reported as "0.00" or "NA", and the carbon stock changes in soils have been reported as "NA", "NO" or "IE". In the previous review report, the ERT recommended that Greece report, in its next annual submission, the carbon stock changes in the litter, dead wood and soil pools, or provide transparent and verifiable information that those pools are not net sources, in accordance with decision 15/CMP.1, annex, paragraph 6(c). In response to this recommendation, Greece has provided transparent and verifiable information in its 2013 annual submission demonstrating that the dead wood, litter and soil pools are not net sources. The ERT welcomes this improvement made by Greece.

85. Greece explained in the NIR that the emissions and removals from afforestation and reforestation activities are identical to the emissions and removals from land converted to forest land. However, the Party has reported the emissions and removals from grassland converted to forest land as "NE" and "NO" since, as explained in the NIR, the areas of grassland converted to forest land have not yet been mapped. In response to a question raised by the ERT during the review, Greece cited the text from the 2006 IPCC Guidelines (volume 4 (agriculture, forestry and other land use (AFOLU)), section 4.3), namely: while land conversion may result in an initial loss of carbon due to changes in biomass, dead organic matter and soil carbon pools, natural regeneration or plantation practices lead to carbon accumulation. However, the ERT considers that there is an upfront loss of carbon stocks following land-use conversion due to the loss of living biomass followed by a slow accumulation of carbon stocks in dead organic matter and soils. This could result in emissions or removals depending upon when the land-use conversion to forest land occurred among other factors. The ERT strongly recommends that Greece map the areas of grassland converted to forest land and include the emissions and removals from them under afforestation and reforestation activity in its next annual submission.

Deforestation – CO_2 and N_2O[6]

86. Greece does not provide sufficient information in the NIR on how deforestation is distinguished from harvesting and forest disturbance according to paragraph 8(b) of the annex to decision 15/CMP.1. Greece explained in the NIR that only those areas that are "legally deforested" are reported as deforested and other areas that have undergone forest cover loss are considered to be "reforested naturally or after human intervention". However, there is no mention in the NIR of whether this is so defined under any legal framework or whether it is simply an assumption. Moreover, there is no description of how these lands are tracked into the future to ensure that those areas that do not regrow within a specified time frame could be reclassified under deforestation. In response to a question raised by the ERT during the review, Greece explained that areas that temporarily lost their tree cover are not classified as deforested under the legislative framework of Greece. Although the information to enable the tracking of such lands is collected by the local Forest Services, it is not readily publicly available. The ERT recommends that Greece provide transparent information on how deforestation is distinguished from harvesting and forest disturbance and, in particular, how local Forest Services track lands that have temporarily lost forest cover but are not classified as deforested, and include this information in its next annual submission.

87. Greece has reported the carbon stock changes for the above- and below-ground biomass, litter, dead wood and soil carbon pools for the years 2008–2011 in the 2013 annual submission. Among those pools, the carbon stock changes in the litter, dead wood and soil carbon pools were reported for the first time, following a recommendation made in the previous review report. Those pools were reported as "NE" in the 2012 submission. The ERT commends Greece for its efforts to improve the completeness of its reporting.

88. Greece has reported the N_2O emissions from disturbance associated with land-use conversion to cropland under deforestation activity as "NA". However, the ERT notes that areas of forest land converted to cropland have been reported as 0.10 ha in CRF table 5.B for cropland. Consequently, it is reasonable to expect that there will be associated N_2O emissions from this conversion, which should be included under deforestation activity. In response to a question raised by the ERT during the review, Greece explained that the total area of forest land converted to cropland since 1990 is negligible (0.01 kha), occurring only in one year (from 2009 to 2010) of the commitment period and, consequently, the N_2O emissions from disturbance associated with land-use conversion to cropland are expected to be small. Further, Greece confirmed that the above-mentioned emissions will be estimated and reported in its next annual submission. Considering the fact that this is a missing estimate of emissions from a Kyoto Protocol activity, the ERT strongly recommends that Greece estimate and report the N_2O emissions from disturbance associated with land-use conversion to cropland under deforestation activity in its next annual submission.

Activities under Article 3, paragraph 4, of the Kyoto Protocol

Forest management – CO_2

89. Consistent with the estimates reported under forest land remaining forest land as explained in paragraph 66 above, Greece has reported the carbon stock changes under forest management activity using the stock change method from the IPCC good practice guidance for LULUCF. However, the previous review report pointed out that the comparison of data reported by Greece against the outcomes of the IPCC gain–loss method

[6] Not all emissions related to all gases under this category are key categories, particularly N_2O emissions. However, since the calculation procedures for issues related to this category are discussed as a whole, the individual gases are not assessed in separate sections.

using data and parameters provided by the Party showed some unusual values, resulting in a potential overestimation of removals. Therefore, the previous review report recommended that Greece verify the results of its carbon stock change method, through the application of the IPCC gain–loss method, and include the outcomes of this verification activity in its next annual submission. However, the ERT notes that Greece has not included the results of the above-mentioned verification activity in the NIR. The ERT strongly reiterates the recommendation made in the previous review report that Greece include the results of the above-mentioned verification activity in its next annual submission, and revise its estimations, if necessary.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

90. Greece has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings and recommendations included in the standard independent assessment report (SIAR) on the SEF tables and the SEF comparison report.[7] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings and recommendations contained in the SIAR relating to the inconsistencies of the information reported by Greece on records of any discrepancies and on any records of non-replacement with the information provided by the international transaction log (ITL).

91. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with decision 15/CMP.1, annex, chapter I.E, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the ITL and the clean development mechanism registry, and meets the requirements referred to in decision 22/CMP.1, annex, paragraph 88(a–j). The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No non-replacement has occurred, however three discrepancies have been identified by the ITL during the reporting period.

92. The ERT noted that the information indicating that no discrepancies occurred during the reporting period, reported by Greece in the NIR (section 11.2) concerning records of discrepancies and records of non-replacement, was not consistent with the information provided to the secretariat by the ITL. In the SIAR, it is indicated that Greece stated that no corrective actions were necessary, because the problem causing the discrepancies originated outside the Party's national registry and related to the transition from the former system to the European Union (EU) registry. The ERT concluded that Greece's records on its accounting of Kyoto Protocol units contained in its national registry are consistent with the corresponding records of the ITL, and that the national registry has adequate procedures in place to minimize discrepancies. The ERT recommends that Greece report more accurate information on discrepancies and provide additional information in its next annual submission on any corrective actions undertaken to correct any problem that caused a discrepancy to occur. The ERT also reiterates the recommendation contained in the SIAR that Greece fully report all discrepancies in the official R2 report.

[7] The SEF comparison report is prepared by the international transaction log (ITL) administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

Calculation of the commitment period reserve

93. Greece has reported its commitment period reserve in its 2013 annual submission. The Party reported its commitment period reserve to be 591,375,861 t CO_2 eq based on the national emissions in its reviewed inventory of the 2012 annual submission (118,275.172 Gg CO_2 eq). However, the ERT noted that the most recently reviewed inventory is that for 2011 (115,045.02 Gg CO_2 eq). Therefore, the ERT disagrees with the commitment period reserve reported by the Party in its 2013 annual submission. The commitment period reserve calculated by the ERT based on the estimated GHG emissions for 2011 is, therefore, 575,225,094 t CO_2 eq. The ERT recommends that Greece report accurate information on its commitment period reserve in its next annual submission.

3. Changes to the national system

94. Greece reported that there is a change in its national system since the previous annual submission. The Party described in the NIR this change, which is that the entity responsible for compiling the LULUCF section of the inventory under the Convention and under the Kyoto Protocol has been changed to NTUA from the General Directorate for the Development and Protection of Forests and Natural Environment of MEECC. The ERT concluded that the national system of Greece continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

4. Changes to the national registry

95. Greece reported that there are changes in its national registry since the previous annual submission. The Party described in the NIR (page 355) the changes, specifically due to the centralization of the EU ETS operations into a single EU registry operated by the European Commission called the Consolidated System of EU registries (CSEUR). The CSEUR is a consolidated platform which implements the national registries in a consolidated manner and was developed together with the new EU registry. Although Greece reported in the NIR that complete description and documentation on the CSEUR is provided in an appendix to the NIR, that documentation was missing.

96. The ERT noted the main findings contained in the SIAR relating to the implementation of the CSEUR, in particular those related to the fulfilment of the requirements regarding the public availability of information in accordance with section II.E of the annex to decisions 13/CMP.1, the description of the changes in database structure and the reporting of test results. In response to questions raised by the ERT during the review, Greece provided further confidential information on the changes to the national registry, specifically due to the transition to the CSEUR. The ERT reiterates the issues and their related recommendations regarding the national registry of Greece noted in the SIAR, as follows:

(a) Greece does not provide public information on its website related to the Article 6 project information. Therefore, the ERT reiterates the recommendation in the SIAR that Greece includes Article 6 project information and holding and transaction information on its website;

(b) Greece does not fully report changes in the national registry related to the description of the database structure during the registry review. While Greece has resubmitted a simplified data model during the assessment cycle, the information contained within the model is not sufficient. This is evidenced by the lack of descriptions of each entity in the diagram and the omission of some diagram entities required in the data exchange standards (DES). Therefore, the ERT reiterates the recommendation in the SIAR that, following major changes, Greece provide a complete data model which contains all required entities in the DES with descriptions in the NIR of its annual submissions;

(c) Greece does not fully report changes in the national registry related to a change of test results during the registry review. While Greece has resubmitted the required information during the assessment cycle, the provided test report reveals a test plan which was of insufficient scope. This is evidenced by the limited number of Kyoto Protocol processes covered and the absence of DES compliance demonstration through Annex H testing. Compliance with the DES requirements is essential to maintain confidence that the national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1. Therefore, the ERT reiterates the strong recommendation in the SIAR that Greece test each release thoroughly against the DES as part of each major release cycle and provide the complete results in the NIR of its annual submissions.

97. The ERT concluded that, taking into account the confirmed changes in the national registry, including the additional information provided to the ERT during the review, Greece's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP). With respect to the provision of information related to database structure specifically, the ERT encourages the Party to provide additional information in the NIR. The ERT recommends that Greece include all other additional information in response to the SIAR findings in its NIR in accordance with decision 15/CMP.1, annex, chapter I.G.

5. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

98. Greece did not provide information on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol in its 2013 annual submission. However, as in the previous annual submission, Greece reported detailed information on the minimization of adverse impacts in accordance with the requirements outlined in decision 15/CMP.1, annex, paragraphs 23 and 24. The ERT concluded that the reported information continues to be complete and transparent. The ERT recommends that the Party, in its next annual submission, report any change in its information provided under Article 3, paragraph 14, in accordance with decision 15/CMP.1, annex, chapter I.H.

99. In its NIR, Greece described two major EU policies: directive 2009/28/EC on the promotion of the use of energy from renewable sources and directive 2008/101/EC amending directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community, both of which have been identified as having a potential impact on developing countries. The impact assessments related to enhanced biofuel and biomass use at an EU level showed that the cultivation of energy crops could have both positive and negative impacts. Greece is in the process of transposing the directive into national law. As the issue of the sustainability criteria is of high importance to Greece, Greece will adopt national measures in order to respect the sustainability criteria and assess the impact of the production of biofuels on soil, water and biodiversity in developing countries. Another action is the execution of research on second-generation biomass technologies by its research centres and Greece universities. The goal of second-generation biofuel processes is to extend the amount of biofuel that can be produced sustainably by using biomass consisting of the residual non-food parts of current crops. Directive 2008/101/EC has impacts on the aircraft operators from developing countries that operate on routes covered by the scheme. In order to reduce the aggregated costs for third country airlines, especially from regions that include developing countries, airlines operating limited services are exempt from the Community scheme.

100. Greece also reports on its cooperation on advanced fossil-fuel technologies with developing countries: an ongoing project on strengthening the capacity of fossil-fuel exporting countries in the area of energy efficiency via the work of the Energy Expert Group of the Gulf Cooperation Council (GCC), in particular the working subgroup on energy efficiency. Within this, NTUA is currently participating in various projects, including a recently launched project called "EUROGULF" with the objective of analysing EU–GCC relations with respect to oil and gas issues and proposing new policy initiatives and approaches to enhance cooperation between the two regional groups.

III. Conclusions and recommendations

A. Conclusions

101. Table 7 summarizes the ERT's conclusions on the 2013 annual submission of Greece, in accordance with the Article 8 review guidelines.

Table 7
Expert review team's conclusions on the 2013 annual submission of Greece

		Paragraph cross-references
The ERT concludes that the inventory submission of Greece is complete (categories, gases, years and geographical boundaries and contains both an NIR and CRF tables for 1990–2011)		
Annex A sources[a]	Complete	
LULUCF[a]	Not complete	59, 62 and 67–72
KP-LULUCF	Not complete	85 and 88
The ERT concludes that the inventory submission of Greece has been prepared and reported in accordance with the UNFCCC reporting guidelines	Yes	
The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1	Yes	
Greece's inventory is in accordance with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*	Yes	
Greece has reported information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol	Yes	84–89
Greece has reported information on its accounting of Kyoto Protocol units in accordance with decision 15/CMP.1, annex, chapter I.E, and used the required reporting format tables as specified by decision 14/CMP.1	Yes	90
The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1	Yes	94

		Paragraph cross-references
The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions	Yes	97
Did Greece provide information in the NIR on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol?	No	98

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, IPCC = Intergovernmental Panel on Climate Change, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*).

B. Recommendations

102. The ERT identified the issues for improvement listed in table 8. All recommendations are for the next annual submission, unless otherwise specified.

Table 8
Recommendations identified by the expert review team

Sector	*Category*	*Recommendation*	*Paragraph cross-reference*
Cross-cutting	General	Strengthen the QC procedures to ensure the consistency of the data in the NIR and the CRF tables and to improve the explanations provided in the documentation boxes	Table 3
		Provide background information on the AD actually used for the estimates	Table 3
		Fully implement the recommendations made in the previous review reports	15
Energy	Comparison of the reference and sectoral approaches	Provide a detailed comparison between the NCVs used by the IEA and by the inventory team in the reference approach of the annual inventory submission, as well as the specific AD obtained from the verified EU ETS reports, in a tabular format	22

Sector	*Category*	*Recommendation*	*Paragraph cross-reference*
	International bunker fuels	Provide information on how, in the energy balance, the annual fuel consumption for domestic transport is separated from the consumption for international transport based on the fuel supply data from supplier companies	23
	Feedstocks and non-energy use of fuels	Reallocate emissions from liquid fuels used as feedstock in ammonia production from the energy sector to the corresponding category in the industrial processes sector for the years 1990–1993 and 1995–1998	24
	Road transportation – CO_2, CH_4 and N_2O	Improve the description of the recalculations for the whole time series, as well as the description of the calculation for the fuel consumption ratio of lubricants in road transportation to justify the time-series consistency	25
		Complete its improvement plan and reflect any updates in the AD	26
	Navigation: liquid fuels – CO_2, CH_4 and N_2O	Explain the cause of the fluctuation in the consumption of fuel in domestic navigation throughout the time series	27
	Navigation: liquid fuels – CO_2, CH_4 and N_2O	Start a process aimed at providing a more accurate estimate of CO_2 emissions associated with this category by gathering information on the number of arrivals and departures, destination and fleet composition and, if necessary, take into consideration the experiences of other Parties in gathering these data	28
		Establish and present a plan to improve the collection and the quality of data on fuel consumption for vessel categories and ship movement information	28
	Coal mining and handling – CH_4	Report any progress for the estimates of CH_4 emissions from this category resulted from the bilateral QA exercise in October 2013	29
Industrial processes and solvent and other product use	General	Obtain information on the abatement technologies used in aluminium production and nitric acid production and incorporate that information in the reporting of emissions	32

Sector	*Category*	*Recommendation*	*Paragraph cross-reference*
		Continue to collect the data necessary to estimate potential emissions of F-gases per gas type	33
		Improve the QA/QC procedures to ensure accuracy and consistency in the use of the notation keys	34
	Cement production – CO_2	Complete the data collection to estimate emissions for the whole time series and reflect the results in the inventory reporting	35
	Consumption of halocarbons and SF_6 – HFCs	Collect data on HFC emissions from imported foam and provide information on the progress made and results obtained	36
	Ammonia production – CO_2	Complete the ongoing work to obtain more accurate data on the amount of liquid fuel used as feedstock and reflect the updated AD in the emission estimates	37
		Update the CRF tables to include an explanation for reporting "IE"	38
	Consumption of halocarbons and SF_6 – SF_6	Provide additional information on the method used to estimate SF_6 emissions	39
Agriculture	General	Obtain actual statistical data, especially for the key categories, for all years of the time series for use in the emission estimates	44
		Provide a more detailed explanation of the provisional data used for the emission estimates, including the methods used to develop those data	44
	Enteric fermentation – CH_4	For dairy cattle, continue the efforts to develop country-specific values for the parameter digestibility of feed based on national research and recalculate the emission estimates for the entire time series	46
		Provide an appropriate explanation for the use of different milk production data, the generation of AD on nomadic and domestic sheep and the input data used for the calculation of the emission estimates	47
		Provide clear references for the data sources for all parameters	47
	Agricultural soils – N_2O	Document in the NIR the completeness of the AD	49

Sector	*Category*	*Recommendation*	*Paragraph cross-reference*
		Strengthen the arrangements with data providers, primarily with official bodies such as EL.STAT and secondarily with PHAPFDP, on data delivery, including documentation on how the data set has been elaborated	49
	Manure management – CH_4 and N_2O	Investigate the distribution of AWMS for all animal types in detail and update the information provided	51
		Include the shares of VS excretion per AWMS in the NIR to improve the description of the method used, in particular for the expert judgement	52
		Identify the cause of the error while inputting the data on the MCF in CRF table 4.B(a), and correct the software problem, if relevant	53
		Improve the description of the method used to derive the AWMS fractions (liquid and solid systems) from manure separation for the estimation of both CH_4 and N_2O emissions	54
LULUCF	General	Provide transparent information on how the annual land-use change matrices have been developed	56
		Provide a complete set of annual land-use change matrices for the whole time series	57
		Correct the typographical error in the equation for estimating the annual increase in carbon stocks due to biomass growth in new plantations	58
		Collect the necessary information and report the AD and emission/removal estimates for the mandatory categories reported as "NE"	59
		Provide detailed and transparent information on uncertainty assessment for the LULUCF sector	60
		Provide more information on the QA procedures employed for the LULUCF sector	61
		Collect additional information to determine the areas of conversion of cropland to forest land and cropland to grassland by initial crop type and report the carbon stock changes in mineral soils in the appropriate categories	62

Sector	*Category*	*Recommendation*	*Paragraph cross-reference*
		Provide clarification on its reporting of the carbon stock changes in mineral soils in cropland converted to forest land and cropland converted to grassland and the use of a default transition period of 20 years in the estimation process for carbon stock changes in mineral soils for the land-use conversion categories	63
	Forest land remaining forest land – CO_2	Report the carbon stock changes in the dead organic matter and soil carbon pools, or provide evidence transparently substantiating the assertion that the carbon stock changes in the dead organic matter and soil carbon pools are zero	65
		Perform a verification of the results of the carbon stock change method using the IPCC gain–loss method, include the results of this verification, and revise the estimations, if necessary	66
	Land converted to forest land – CO_2	Collect country-specific data on relevant parameters in order to apply higher tier methods to the estimation of the carbon stock changes in all significant pools in cropland converted to forest land and report on the progress made	67
		Collect the necessary information and estimate the carbon stock changes in dead organic matter in land converted to forest land using higher tier methods	68
		Provide information to substantiate the assumption that there have been no losses due to natural disturbance in land converted to forest land since 1994, or provide revised estimates taking into account the carbon stock losses in the living biomass pool due to natural disturbance	69
	Land converted to cropland – CO_2	Report the growth in carbon stocks in the above- and below-ground biomass pools in land converted to cropland for perennial crops in the appropriate category	70
	Land converted to cropland – N_2O	Estimate and report the N_2O emissions from disturbance associated with the conversion of forest land and grassland to cropland	71
		Report the correct numbers for the areas in the CRF tables	71
	Land converted to grassland – CO_2	Estimate and report the carbon stock changes in the living biomass for cropland converted to grassland or provide evidence to substantiate the assertion that carbon stock changes in the living biomass pool amount to zero	72
Waste	General	Improve the consistency of the information in the NIR with that provided in the CRF tables and strengthen the QA/QC procedures to ensure the accuracy and consistency of the information provided in the NIR	75, 78, 79 and 81

Sector	*Category*	*Recommendation*	*Paragraph cross-reference*
	Solid waste disposal on land – CH_4	Provide an explanation of how the historical data on the amount of construction and demolition waste are estimated	77
	Wastewater handling – CH_4	Provide detailed information on wastewater flows and treatment systems, using figure 5.3 from the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* as a guide, in order to improve transparency	80
	Waste incineration – CO_2, CH_4 and N_2O	Provide more information on EFs to improve transparency	82
KP-LULUCF	Afforestation and reforestation – CO_2	Estimate and report the emissions and removals from grassland converted to forest land by mapping the grassland converted to forest land areas and include these in the emissions and removals from the afforestation and reforestation activity	85
	Deforestation – CO_2 and N_2O	Provide transparent information on how deforestation is distinguished from harvesting and forest disturbance. Specify how local Forest Services track lands that have temporarily lost forest cover but are not classified as deforested	86
		Report the N_2O emissions from disturbance associated with land-use conversion to cropland under deforestation	88
	Forest management – CO_2	Apply the IPCC gain–loss method to verify the results of the carbon stock change method and report the results	89
Kyoto Protocol units		Report more accurate information on discrepancies and provide additional information on any corrective actions undertaken to correct any problem that caused a discrepancy to occur	92
		Report more accurate information on discrepancies and provide additional information in its next annual submission on any corrective actions undertaken to correct any problem that caused a discrepancy to occur	92
		Report accurate information on the commitment period reserve	93
National registry		Include Article 6 project information and holding and transaction information on the website	96
		Provide a complete data model which contains all required entities in the DES with descriptions in the NIR	96

Sector	*Category*	*Recommendation*	*Paragraph cross-reference*
		Test each release thoroughly against the DES as part of each major release cycle and provide the complete results in the NIR	96
		Include additional information related to the database structure in its NIR	97
Article 3, paragraph 14, of the Kyoto Protocol		Report any change in its information on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol	98

Abbreviations: AD = activity data, AWMS = animal waste management system, CRF = common reporting format, DES = data exchange standards, EU ETS = European Union emissions trading scheme, IEA = International Energy Agency, IPCC = Intergovernmental Panel on Climate Change, ITL = international transaction log, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, MCF = methane conversion factor, NE = not estimated, NIR = national inventory report, NCV = net calorific value, QA = quality assurance, QC = quality control, VS = volatile solids.

IV. Questions of implementation

103. No questions of implementation were identified by the ERT during the review.

Annex I

Background data on recalculations and information to be included in the compilation and accounting database

Table 9
Recalculations in the 2013 annual submission for the base year and the most recent year

Greenhouse gas source and sink categories	*1990*	*2010*	*1990*	*2010*	*Reason for the recalculation*
	Value of recalculation (Gg CO_2 eq)		*Per cent change*		
1. Energy	–367.74	–919.62	–0.5	–1.0	AD
A. Fuel combustion (sectoral approach)	–367.74	–919.62	–0.5	–1.0	
1. Energy industries					
2. Manufacturing industries and construction		0.0002		0.000002	
3. Transport	–367.74	–919.62	–2.5	–4.0	
4. Other sectors					
5. Other					
B. Fugitive emissions from fuels					
1. Solid fuels					
2. Oil and natural gas					
2. Industrial processes	–27.96	–45.82	–0.3	–0.4	AD, EFs, new method
A. Mineral products	–27.96		–0.4		
B. Chemical industry					
C. Metal production		–0.03		–0.003	
D. Other production					
E. Production of halocarbons and SF_6					
F. Consumption of halocarbons and SF_6	–0.00001	–45.79	-0.0005	–1.3	
G. Other					
3. Solvent and other product use					
4. Agriculture					
A. Enteric fermentation					
B. Manure management					
C. Rice cultivation					
D. Agricultural soils					
E. Prescribed burning of savannas					
F. Field burning of agricultural residues					
G. Other					

Greenhouse gas source and sink categories	*1990*	*2010*	*1990*	*2010*	*Reason for the recalculation*
	Value of recalculation (Gg CO_2 eq)		*Per cent change*		
5. Land use, land-use change and forestry	44.64	41.62	–1.8	–1.6	AD
A. Forest land	35.40	80.31	–2.6	–3.6	
B. Cropland	0.03	–74.95	–0.002	16.6	
C. Grassland	0.19	1.37	1.2	18.3	
D. Wetlands		0.15			
E. Settlements	2.27	2.29	77.3	49.7	
F. Other land	6.76	32.44	62.8	987.9	
G. Other					
6. Waste		–31.61		–0.6	AD, inclusion of new category
A. Solid waste disposal on land		–25.40		–0.7	
B. Wastewater handling		–10.72		–0.7	
C. Waste incineration		–0.28		–6.7	
D. Other		4.78			
7. Other					
Total CO_2 equivalent without LULUCF	**–395.70**	**–997.05**	**–0.4%**	**–0.8**	
Total CO_2 equivalent with LULUCF	**–351.06**	**–955.43**	**–0.3%**	**–0.8**	

Abbreviations: AD = change in activity data, EF = change in emission factor, LULUCF = land use, land-use change and forestry.

Table 10
Information to be included in the compilation and accounting database in t CO_2 eq for 2011, including the commitment period reserve

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Commitment period reserve	591 375 861	575 225 094		575 225 094
Annex A emissions for 2011				
CO_2	94 813 627			94 813 627
CH_4	9 630 758			9 630 758
N_2O	7 010 342			7 010 342
HFCs	3 507 456			3 507 456
PFCs	77 686			77 686
SF_6	5 150			5 150
Total Annex A sources	**115 045 019**			**115 045 019**
Activities under Article 3, paragraph 3, for 2011				
3.3 Afforestation and reforestation on non-harvested land for 2011	–350 626			–350 626
3.3 Afforestation and reforestation on harvested land for 2011	NA			NA
3.3 Deforestation for 2011	45 651			45 651
Activities under Article 3, paragraph 4, for 2011[c]				
3.4 Forest management for 2011	–1 776 866			–1 776 866
3.4 Cropland management for 2011				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2011				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2011				
3.4 Revegetation in the base year				

Abbreviation: NA = not applicable.
[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 11
Information to be included in the compilation and accounting database in t CO_2 eq for 2010

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2010				
CO_2	96 558 511			96 558 511
CH_4	9 784 127			9 784 127
N_2O	7 315 605			7 315 605
HFCs	3 512 162			3 512 162
PFCs	101 573			101 573
SF_6	6 142			6 142
Total Annex A sources	**117 278 121**			**117 278 121**
Activities under Article 3, paragraph 3, for 2010				
3.3 Afforestation and reforestation on non-harvested land for 2010	–350 626			–350 626
3.3 Afforestation and reforestation on harvested land for 2010	NA			NA
3.3 Deforestation for 2010	43 866			43 866
Activities under Article 3, paragraph 4, for 2010[c]				
3.4 Forest management for 2010	–1 774 458			–1 774 458
3.4 Cropland management for 2010				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2010				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2010				
3.4 Revegetation in the base year				

Abbreviation: NA = not applicable.
[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 12
Information to be included in the compilation and accounting database in t CO_2 eq for 2009

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2009				
CO_2	103 577 266			103 577 266
CH_4	9 739 239			9 739 239
N_2O	7 015 586			7 015 586
HFCs	3 226 654			3 226 654
PFCs	69 850			69 850
SF_6	5 258			5 258
Total Annex A sources	**123 633 852**			**123 633 852**
Activities under Article 3, paragraph 3, for 2009				
3.3 Afforestation and reforestation on non-harvested land for 2009	–350 626			–350 626
3.3 Afforestation and reforestation on harvested land for 2009	NA			NA
3.3 Deforestation for 2009	47 949			47 949
Activities under Article 3, paragraph 4, for 2009[c]				
3.4 Forest management for 2009	–1 768 746			–1 768 746
3.4 Cropland management for 2009				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2009				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2009				
3.4 Revegetation in the base year				

Abbreviation: NA = not applicable.
[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 13
Information to be included in the compilation and accounting database in t CO_2 eq for 2008

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2008				
CO_2	109 909 565			109 909 565
CH_4	10 008 735			10 008 735
N_2O	7 474 585			7 474 585
HFCs	2 844 347			2 844 347
PFCs	89 105			89 105
SF_6	7 529			7 529
Total Annex A sources	**130 333 865**			**130 333 865**
Activities under Article 3, paragraph 3, for 2008				
3.3 Afforestation and reforestation on non-harvested land for 2008	–350 626			–350 626
3.3 Afforestation and reforestation on harvested land for 2008	NA			NA
3.3 Deforestation for 2008	52 620			52 620
Activities under Article 3, paragraph 4, for 2008[c]				
3.4 Forest management for 2008	–1 769 567			–1 769 567
3.4 Cropland management for 2008				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2008				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2008				
3.4 Revegetation in the base year				

Abbreviation: NA = not applicable.
[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Annex II

Documents and information used during the review

A. Reference documents

Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

Intergovernmental Panel on Climate Change. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.htm>.

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories". FCCC/SBSTA/2006/9. Available at <http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>.

"Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention". FCCC/CP/2002/8. Available at <http://unfccc.int/resource/docs/cop8/08.pdf>.

"Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol". Decision 19/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=14>.

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Decision 15/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>.

"Guidelines for review under Article 8 of the Kyoto Protocol". Decision 22/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>.

Status report for Greece 2013. Available at <http://unfccc.int/resource/docs/2013/asr/grc.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2013. Available at <http://unfccc.int/resource/webdocs/sai/2013.pdf>

FCCC/ARR/2012/GRC. Report of the individual review of the annual submission of Greece submitted in 2012. Available at <http://unfccc.int/resource/docs/2013/arr/grc.pdf>.

UNFCCC. *Standard Independent Assessment Report*, parts I and II. Available at <http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php>.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. George Tegos Zisis (Ministry of Environment, Energy and Climate Change) and Mr. Ioannis Sempos (National Technical University of Athens), including additional information on the methodology and assumptions used.

Annex III

Acronyms and abbreviations

AD	activity data
AWMS	animal waste management system
CH_4	methane
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
DOC_f	fraction of degradable organic carbon dissimilated
EF	emission factor
ERT	expert review team
EU	European Union
EU ETS	European Union emissions trading scheme
FAO	Food and Agriculture Organization of the United Nations
F-gas	fluorinated gas
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
ha	hectare
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
kg	kilogram (1 kg = 1,000 grams)
kha	kilohectare
KP-LULUCF	land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
kt	kilotonne
LULUCF	land use, land-use change and forestry
m^3	cubic metre
MCF	methane conversion factor
Mg	megagram (1 Mg = 1 tonne)
N	nitrogen
N_2O	nitrous oxide
NA	not applicable
NCV	net calorific value
NE	not estimated
NIR	national inventory report
NO	not occurring
NO_X	nitrogen oxides
PFCs	perfluorocarbons
PJ	petajoule (1 PJ = 10^{15} joule)
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
t	tonne

TJ	terajoule (1 TJ = 10^{12} joule)
TOC	total organic carbon
UNFCCC	United Nations Framework Convention on Climate Change
VS	volatile solids